of leaf cuttings ($P_2$ and $P_5$) recorded root lengths of 8.03, 8.87, 6.18 and 7.36 cm for sand and pot-mixture media respectively. A longer root length (13.79 cm) was recorded in sucker in the sand medium followed by terminal cuttings from vegetative shoots. Planting during June - July produced longer roots (10.93 cm) followed by April - May (9.88 cm). Thus there were significant differences between propagules and media in respect of length of the roots also.

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# RESPONSE OF FINGER MILLET TO MOISTURE REGIMES AND NITROGEN LEVELS

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## ABSTRACT

Field experiments conducted at the Tamil Nadu Agricultural University, Coimbatore during Rabi 1985-86 and Kharif, 1986 indicated that irrigating at 0.6 IW/CPE ratio throughout the crop period with an application of 80 kg N/ha was found to be most economical for finger millet Co. 11) grown under vertisols. The quadratic polynominal function with water and N as variables was found to be the best.

KEY WORDS : Finger millet, Moisture, Nitrogen.

Finger millet (*Eleusine coracana* Gaertn.) is an important food crop predominantly cultivated in Karnataka, Tamil Nadu and Andhra Pradesh. Tamil Nadu produces 350 thousand tonnes of grain from an area of 340 thousand hectares. Nearly fifty percent of the area under finger millet in Tamil Nadu is under irrigation (Rachie and Peters, 1977). Water is an important input and a resource that has been developed at enormous cost. Scheduling irrigation to meet the crop demand rather than meeting the crop water requirement will improve the efficiency of this scarce resource. Fertilizer application especially N improves the water use efficiency of crops which however depends on the balance of demand and supply of moisture at the critical stages of growth. Information is very little on N requirement of finger millet in relation to moisture supply.

## MATERIALS AND METHODS

An experiment was conducted at the Tamil Nadu Agricultural University, Coimbatore during rabi, 1985-'86 and Kharif, 1986 to study the response of finger millet (Co.11) to moisture regimes and nitrogen.

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**Table 1. Moisture regimes and N on Yield, CU and WUE of finger millet.**

| | Moisture | | | Productive tiller No/hill | 1000 grain wt(g) | Grain yield (kg ha$^{-1}$) | CU (mm) | WUE Kg. ha mm-1 | Water to one Q of grain (mm) |
|---|---|---|---|---|---|---|---|---|---|
| | Stages | | | | | Rabi 1985 - 86 | | | |
| | 1 | 2 | 3 | | | | | | |
| M1 | 0.6 | 0.6 | 0.6 | 5.00 | 2.30 | 4602 | 380 | 12.1 | 8.3 |
| M2 | 0.3 | 0.6 | 0.6 | 4.46 | 2.00 | 3685 | 333 | 11.1 | 9.0 |
| M3 | 0.3 | 0.6 | 0.9 | 4.79 | 2.20 | 4411 | 397 | 11.1 | 9.0 |
| M4 | 0.6 | 0.3 | 0.9 | 4.35 | 1.92 | 3490 | 341 | 10.2 | 9.8 |
| M5 | 0.3 | 0.9 | 0.6 | 4.64 | 2.14 | 4011 | 332 | 12.1 | 8.3 |
| CD (5%) | | | | 0.30 | 0.05 | 215 | - | - | - |
| Nitrogen | | | | | | | | | |
| $N_0$ | | | | 3.44 | 1.82 | 2861 | 340 | 8.4 | 11.9 |
| $N_{40}$ | | | | 4.32 | 2.02 | 3618 | 351 | 10.3 | 9.7 |
| $N_{80}$ | | | | 4.79 | 2.11 | 4352 | 358 | 12.2 | 8.2 |
| $N_{120}$ | | | | 5.08 | 2.19 | 4426 | 361 | 12.3 | 8.1 |
| $N_{160}$ | | | | 5.15 | 2.26 | 4492 | 364 | 12.3 | 8.1 |
| $N_{200}$ | | | | 5.11 | 2.22 | 4490 | 364 | 12.3 | 8.1 |
| CD (5%) | | | | 0.28 | 0.13 | 542 | - | - | - |
| | Stages | | | | | Kharif 1986 | | | |
| | 1 | 2 | 3 | | | | | | |
| $M_1$ | 0.6 | 0.6 | 0.6 | 5.02 | 2.35 | 4613 | 413 | 11.17 | 8.95 |
| $M_2$ | 0.3 | 0.6 | 0.6 | 4.68 | 2.07 | 3911 | 357 | 10.95 | 9.13 |
| $M_3$ | 0.3 | 0.6 | 0.9 | 4.83 | 2.22 | 4456 | 389 | 11.45 | 8.73 |
| $M_4$ | 0.6 | 0.3 | 0.9 | 4.34 | 1.95 | 3541 | 352 | 10.05 | 9.95 |
| $M_5$ | 0.3 | 0.9 | 0.6 | 4.71 | 2.15 | 4077 | 360 | 11.32 | 8.83 |
| CD (5%) | | | | 0.34 | 0.12 | 141 | - | - | - |
| NITROGEN | | | | | | | | | |
| $N_0$ | | | | 3.60 | 1.91 | 3096 | 315 | 9.83 | 10.17 |
| $N_{40}$ | | | | 4.35 | 2.05 | 3677 | 339 | 10.85 | 9.22 |
| $N_{80}$ | | | | 4.90 | 2.16 | 4371 | 380 | 11.50 | 8.69 |
| $N_{120}$ | | | | 5.10 | 2.28 | 4444 | 394 | 11.28 | 8.86 |
| $N_{160}$ | | | | 5.17 | 2.24 | 4583 | 405 | 11.23 | 8.90 |
| $N_{200}$ | | | | 5.20 | 2.25 | 4548 | 411 | 11.15 | 8.96 |
| CD (5%) | | | | 0.23 | 0.18 | 188 | - | - | - |

The soil type was Typic ustivertept with a pH of 8.1, low in available N (204 to 251 hg ha$^{-1}$ medium in available P (11.6 to 16.8 hg ha$^{-1}$) and high in potassium (705 to 852 he ha$^{-1}$). The experiment was laid out in split plot design with moisture levels allotted to main plots and nitrogen levels to the sub-plots (Table 1) and replicated thrice. The crop growth was devided into three stages viz., planting to panicle initiation (stage 1), panicle initiation to flowering (stage 2) and flowering to maturity (stage 3). Varying ratios of IW/CPE were imposed at different stages for scheduling irrigation (Table 1).

The data on yield attributes, grain yield, consumptive and water use efficiency of finger millet during both the seasons are

given in Table 1. Highest number of productive tillers and thousand grain weight was obtained with $M_1$ moisture regime in both the seasons. Lowest number of tillers and thousand grain weight was observed with $M_4$ which experienced moisture stress during PI to flowering in both the seasons. The decline in thousand grain weight might be due to slightly excessive vegetative growth and improper filling of grains due to reduced period of reproductive phase in $M_4$. With regard to N levels, there was appreciable increase in productive tillers and thousand grain weight with increase in N from 0 to 160 and 120 Kg $ha^{-1}$ in rabi and harif seasons respectively indicating the vital role of N in producing the productive tillers and proper filling of grains.

The grain yield was the highest under $M_1$ in both the seasons and was comparable with $M_3$ during rabi only. The next best moisture regime was $M_5$. Grain yield of finger millet beyond 80 kg N/ha levelled off. No significant interaction of moisture and N on grain yield was observed during the two seasons of study. However, the production function of water and N worked out to be quadratic for finger millet. The function is

$$Y = 34.82\ W + 14.59\ N + 0.027\ WN - 0.04\ W^2 - 0.07\ N^2 - 3390.93$$

In general, the consumptive use was more during Kharif than in rabi. Moisture regime at $M_1$ consumed 380 and 413 mm of water during rabi and kharif, respectively including the water used for nursery. The water consumed by $M_1$ regime during rabi was on an average about 10 percent less compared to kharif. Highest water use efficiency was obtained with $M_1$ regime and 80 kg. N $ha^{-1}$ in the two seasons. Water requirement of finger millet varied from 350 mm to 500 mm at different locations in India (Sivanappan and Balasubramanian, 1974, Ramaswamy and Subramanian, 1978, Reddy *et al.*, 1982).

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